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09/725,165	11/29/2000	Jose Geraldo Furtado Ramos	2764-34	8558

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EXAMINER	
LEUNG, JENNIFER A	

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1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/725,165	RAMOS ET AL.	
	Examiner	Art Unit	
	JENNIFER A. LEUNG	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date. _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on April 29, 2008 has been carefully considered. Claim 2 is cancelled. Claim 7 is newly added. Claims 1 and 3-7 are under consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Stine et al. (US 3,231,326) and Zenz (*Fluidization, Solids Handling and Procession*. Chapter 12: Cyclone Design. pp. 812-815).

Owen et al. (see FIG. 1; column 3, line 65 to column 4, line 30; column 5, lines 19-35) discloses an apparatus comprising:

a primary cyclone **65** and a secondary cyclone **67** disposed in a separator vessel **75**,

wherein a cyclone separator leg joins the lower end of the leg **69** of the secondary cyclone **67** and the leg **71** of the primary cyclone **65** to form a single primary and secondary cyclone leg complex where solids collected by both cyclones are combined (see FIG. 1), the termination of the cyclone separator leg being immersed in a fluidized bed of particles **73**.

Owen et al. is silent as to the cyclone separator leg terminating distally in an open, single leg termination that is devoid of movable sealing parts at all times. Although not specifically described by Owen et al., it appears from the illustration of FIG. 1 that the cyclone separator leg does, however, terminate distally with *some* sort of dip-leg sealing arrangement. The Examiner takes Official Notice that such illustration is commonly used in the art to suggest dip-leg sealing arrangements.

Perry's Chemical Engineers' Handbook, however, teaches conventional dip-leg sealing arrangements for cyclone separators, wherein, as an alternative to a sealing arrangement with moveable sealing parts (see FIG. 17-22 (a)), the sealing arrangement may comprise an open termination that is devoid of movable sealing parts at all times (see FIG. 17-22 (e)).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the cyclone separator leg in the apparatus of Owen et al. such that the leg terminated distally in an open, single leg termination that was devoid of movable sealing parts at all times, because such a leg termination would have been recognized as a well known sealing arrangement for cyclones in the art, as evidenced by Perry's Chemical Engineers' Handbook. Furthermore, the substitution of known equivalent structures (i.e., the substitution of one known dipleg sealing arrangement for another known dipleg sealing arrangement) involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423

(CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

Owen et al. (see Figure I) further discloses that the leg **69** of the secondary cyclone **67** extends substantially straight and vertically aligned with a center axis of the secondary cyclone **67** to a junction thereof with the leg **71** of the primary cyclone **65**, the leg **71** of the primary cyclone **65** is inclined with respect to a center axis of said primary cyclone **65** to extend from said primary cyclone **65** to said junction, and said separator leg extends substantially straight and vertically aligned with the center axis of the secondary cyclone **67**, from the junction and along a portion of a length thereof. The connecting configuration of the legs **69** and **71** in Owen et al. is similar to the claimed configuration, except that configuration in Owen et al. is reversed (i.e., in Applicant's apparatus, the leg of the primary cyclone is straight and the leg of the secondary cyclone is inclined).

However, it would have been an obvious matter of design choice to a person of ordinary skill in the art at the time the invention was made to reverse the connecting configuration of the legs **69** and **71** in the modified apparatus of Owen et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because Applicant has not disclosed that the connecting configuration of the primary cyclone leg to be straight and the secondary cyclone leg to be inclined (as opposed to the primary cyclone leg being inclined and the secondary cyclone leg being straight, as in Owen et al.) provides an advantage, is used for a particular purpose, or solves a stated problem.

Furthermore, one of ordinary skill in the art would have expected Applicant's invention to perform equally well with the connecting configuration of the legs being reversed, because the ability of the legs to convey particles from the primary and secondary cyclones back to the fluidized bed of particles does not appear to be affected by whether a specific cyclone leg is straight or inclined. In addition, it is noted that the claimed connecting configuration would have been considered a conventional design choice in the art, as evidenced by Stine et al. For example, Stine et al. (see Figure) teaches a cyclone separator system comprising a primary cyclone **6**,**17** and a secondary cyclone **9**,**20**, wherein the leg **8**,**18** of the primary cyclone extends substantially straight and vertically aligned with a center axis of the primary cyclone to a junction thereof with the leg **12**,**21** of the secondary cyclone, the leg **12**,**21** of the secondary cyclone is inclined with respect to a center axis of the secondary cyclone to extend from said secondary cyclone to said junction, and the separator leg extends substantially straight and vertically aligned with the center axis of the primary cyclone **6**,**17**, from the junction and along a portion of a length thereof.

The newly added limitation of, "a separator vessel having a pressure in excess of those inside the primary and secondary cyclones," and the previously stated limitation of, "said fluidized bed of particles within the cyclone legs being located above the junction of the lower ends of the secondary and primary cyclone legs," add no further patentable weight to the apparatus claims, because the relative pressures and the specific level of particles within the cyclone legs are process limitations and will ultimately depend on the manner in which the claimed apparatus is intended to be operated. For instance, as is well known in the art of cyclone design, "[t]he extent to which the dipleg of a cyclone is filled with exiting solids depends on the

pressure balance around the cyclone and it dipleg," (Zenz, page 813, under "Pressure Balance"). In addition, a claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also, expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim, *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969), and the inclusion of a material or article worked upon by a structure being claimed does not impart patentability to the claims. *In re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935); *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963).

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Stine et al. (US 3,231,326) and Zenz (*Fluidization, Solids Handling and Procession*. Chapter 12: Cyclone Design. pp. 812-815), as applied to claim 1 above, and further in view of Braun et al. (US 5,079,379).

Perry's Chemical Engineers' Handbook further teaches a sealing arrangement comprising a radius-curved, open, termination that is devoid of movable sealing parts at all times (see FIG. 17-22 (b)). Braun et al. further teaches the use of a radius-curved, open, single leg termination that is devoid of movable sealing parts at all times (i.e., at the bottom of leg **23**; no movable sealing parts are mentioned; see FIG. 1), disposed below the level of the fluidized bed of particles **10**, for sealing a cyclone separator **20**.

It would have been obvious for one of ordinary skill in the art at the time the invention

was made to substitute a radius-curved, open, termination for the termination in the modified apparatus of Owen et al., because such a leg termination would have been recognized as a well known sealing arrangement for cyclones in the art, as evidenced by Perry's Chemical Engineers' Handbook and Braun et al. Furthermore, the substitution of known equivalent structures (i.e., the substitution of one known dipleg sealing arrangement for another known dipleg sealing arrangement) involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Stine et al. (US 3,231,326), Zenz (*Fluidization, Solids Handling and Procession*. Chapter 12: Cyclone Design. pp. 812-815), and Braun et al. (US 5,079,379), as applied to claim 7 above, and further in view of Danielsen et al. (U.S. 4,996,028).

The combination of Owen et al., Perry's, Stine et al., Zenz and Braun et al. fails to teach the claimed ratio range of radius-to-diameter for the single leg termination. Danielsen et al., however, teaches, "the radius of curvature of the tubular body portion **25** preferably is in the range of from *about 1 1/2 times to about 2 1/2 times* the diameter of the tubular body portion **25**." (column 3, lines 2-10; FIG. 1-2). It would have been obvious for one of ordinary skill in the art at the time the invention was made to select a ratio of radius-to-diameter within the instantly claimed range for the single leg termination in the modified apparatus of Owen et al.,

on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because maintaining a pre-determined, sufficient, radius of curvature increases, under conditions of use, the stability of the dipleg solids level over that of diplegs having straight run tubular body portions, as taught by Danielson. (column 3, lines 2-10; FIG. 1-2).

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Stine et al. (US 3,231,326), Zenz (*Fluidization, Solids Handling and Procession*. Chapter 12: Cyclone Design. pp. 812-815), and Braun et al. (US 5,079,379), as applied to claim 7 above, and further in view of Luckenbach (U.S. 4,074,691) and Linden (US 2,341,671).

Regarding claim 4, the combination of Owen et al., Perry's, Stine et al., Zenz and Braun et al. fails to teach the radius curve termination of the cyclone leg being constructed from a succession of straight tube sections arranged in an arcuate array. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to substitute an alternate construction (e.g., one including straight tube sections) for the radius curve termination in the modified apparatus of Owen et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). To evidence the conventionally of such curvature construction, Luckenbach (FIG. 1) teaches a cyclone comprising a dipleg **16** having a leg termination constructed of a pair of interconnected angularly disposed conduit members **12**

and **14**, the upper one of which is lineal and connected with the lower vertical portion of the cyclone dipleg **16**. Similarly, Linden teaches a cyclone separator in which the production of the bent body is facilitated by making the individual sections not with curved, but with straight axes, which are inclined one to the next (see FIGs. 2, 3; page 1, column 2, line 55 to page 2, column 1, line 3).

Regarding claim 5, as modified above, the radius curve at the end of the cyclone leg in the modified apparatus of Owen et al. inherently directs the flow of descending mass of solids into a plane orthogonal to the ascending gaseous flow, by virtue of the total angle subtended by the radius curve.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Stine et al. (US 3,231,326), Zenz (*Fluidization, Solids Handling and Procession*. Chapter 12: Cyclone Design. pp. 812-815), and Braun et al. (US 5,079,379), as applied to claim 7 above, and further in view of Jahnke et al. (US 4,220,623).

As shown in FIG. 1 of Owen et al., the junction of the leg **71** of the primary cyclone **65** and the leg **69** of the secondary cyclone **67** lies on the side opposite a distal end of the cyclone leg termination and higher than the distal end by a given length. Owen et al., however, is silent as to precise value of the length being shown, relative to the diameter of the leg **71** of the primary cyclone **65**. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate length for the distance between the junction and the distal end, relative to the diameter of the leg **71** of the primary cyclone **65,** in the modified apparatus of Owen et al., on the basis of suitability for the intended use and absent

showing any unexpected results, because the precise length would have been considered a result effective variable by one having ordinary skill in the art, as evidenced by Jahnke et al. (see column 2, lines 6-19). Accordingly, one having ordinary skill in the art would have routinely optimized the length between the leg junction and the distal end to obtain a sufficient accumulation of catalyst in the separator leg for preventing the underflow of vapors from the cyclone separator back into the fluidized bed, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

7. Applicant's arguments filed April 29, 2008 have been fully considered but they are not persuasive.

Regarding Applicant's newly added limitation of "a separator vessel having a pressure in excess of those inside the primary and secondary cyclones," (claim 1, lines 3-4), the pressure inside the separator vessel, relative to the pressure inside the cyclones, is considered a process limitation that does not add any further patentable weight to the apparatus claims. A recitation of the intended use of the claimed apparatus must result in a structural difference between the claimed apparatus and the prior art in order to patentably distinguish the claimed apparatus from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant case, the modified apparatus of Owen et al. would be structurally capable of being operated to produce a higher pressure in the separator vessel versus the cyclone separators, by adjusting the appropriate process parameters (e.g., flow rates, etc.).

Applicant (at page 11, last paragraph) further argues that the Owen et al. cyclone system is a Positive Cyclone System, and not the Negative Cyclone System being claimed by Applicant (i.e., as defined by Applicant, a Negative Cyclone System occurs when the pressure in the cyclones is lower than the pressure inside the separator vessel). In particular, Applicant argues,

> "It is well known in the state of art of cyclones, that there are not sealing problems in Positive Cyclone Systems. That is why Owen uses two separated plenum chambers in his invention, besides the sulfur reduction in stream for posterior treatment plenum chamber 79 for the Positive Cyclone System (comprising cyclones 65 and 67) and another one (plenum chamber 93) for the Negative Cyclone (89). Besides, it is important to emphasis that the Negative Cyclone (89) uses a movable conventional sealing (probably a trickle valve), the elimination of which applicant's invention is advancing, due its low performance."

Applicant's argument is not found persuasive.

Since Owen et al. never mentions anything about the pressure within the separator vessel or the pressure within the cyclone separators, Applicant cannot properly conclude that the cyclone separators **65** and **67** are operated as Positive Cyclones.

Firstly, Owen et al.'s provision of separate plenum chambers **79** and **93** for the respective cyclone systems does not necessarily lead to Applicant's conclusion that the cyclones **65** and **67** must be Positive Cyclones and the cyclone **87** (mislabeled by Applicant as **89**) must be a Negative Cyclone. Owen et al. discloses that the reason for providing separate plenum chambers is so that,

> "The gaseous products of combustion and containing sulfur compounds separated from the catalyst discharged from riser regenerator **51** are maintained segregated from other later obtained regeneration combustion gas products so that any sulfur compounds or conversion products thereof may be separately recovered from the bulk of the regenerator

flue gas obtained…" (see column 5, lines 35-55).

Owen et al. never mentions anything about maintaining different pressures within the plenum chambers **79** and **93**, and therefore, Applicant's conclusion that the cyclones **65** and **67** are Positive Cyclones and the cyclone **87** is a Negative Cyclone would be based on improper assumptions.

Secondly, Applicant states that Negative Cyclones, such as cyclone **87**, require the use of movable conventional sealing elements. Given that Owen et al. schematically illustrates the provision of sealing means on the end of the dipleg for cyclone **87** as well as the end of the single dipleg for cyclones **65** and **67**, Applicant's statement would then lead to the opposite conclusion that the cyclones **65** and **67** are similarly Negative Cyclones.

Thirdly, it appears that Applicant is arguing that because the cyclones **65** and **67** are connected to a riser **51**, the cyclones must be Positive Cyclones. However, this argument is not persuasive, because it is noted that Applicant's disclosure (see FIG. 1 and specification, at page 5, lines 3-30, and in particular, lines 21-30) similarly presents a configuration of cyclones **3** and **4** that are connected to a riser **1**, and the pressure inside the separator vessel **2** is normally in excess of those encountered inside the cyclones **3** and **4**. Therefore, Applicant's conclusion that the cyclones **65** and **67** are Positive Cyclones, simply because they are connected to a riser **51**, would be based on improper assumption.

In any event, as mentioned above, the pressure inside the separator vessel, relative to the pressure inside the cyclones, is considered a process limitation that does not add any further patentable weight to the apparatus claims, and the modified apparatus of Owen et al. would be structurally capable of being operated to produce a higher pressure in the separator vessel versus

the cyclone separators (as Negative Cyclones), by adjusting the appropriate process parameters (e.g., flow rates, etc.).

Regarding Applicant's arguments on the Stine et al. reference (at page 7, third paragraph, to page 8, second paragraph), the Stine et al. reference was merely relied upon to evidence that the claimed cyclone leg connecting configuration (with the primary cyclone leg being straight and the secondary cyclone leg being inclined) would have been considered a conventional design choice in the art, and a satisfactory alternative to the cyclone leg connecting configuration in Owen et al. (with the primary cyclone leg being inclined and the secondary cyclone leg being straight). The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Furthermore, the Examiner maintains that it would have been an obvious matter of design choice to a person of ordinary skill in the art to configure the primary and secondary cyclone legs with the claimed cyclone leg connecting configuration, because Applicant has not disclosed that the provision of a straight primary cyclone leg and an inclined secondary cyclone leg provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art would have further expected Applicant's invention to perform equally well with either the cyclone leg connecting configuration in Owen et al. (with the primary cyclone leg being inclined and the secondary cyclone leg being straight), or the claimed cyclone leg connecting configuration (with the primary cyclone leg being straight and the secondary cyclone leg being

inclined), because both configurations would have been suitable for performing the same function of routing the separated particles from the primary and secondary cyclones to a common dipleg for discharge into the fluidized bed of particles.

Furthermore, Applicant argues that the specific cyclone leg connecting configuration (with the primary cyclone leg being straight and the secondary cyclone leg being inclined) is used to solve the prior art problems, including the "bad functioning and stream failures" (at page 10, last paragraph, to page 11, first paragraph). However, as noted from Applicant's discussion of the prior art (specification, page 1, line 8 to page 4, line 19), the problems are not solved by the specific slanting of one cyclone leg relative to another, but the terminal configuration of a radius curve on a common dipleg. For instance, the specification (page 5, lines 13-19) states,

> "The terminal configuration allows improved, efficient sealing in such a manner as to prevent the re-entrainment of particles, and to reduce of eliminate the risk of the "packing down" of the dense bed of particulates collected in the cyclones. It avoids the mechanical failures which may arise in movable sealing systems, since the flapper or trickle valves are dispensed with the results of its use is a substantial increase in efficiency and consequent reduction of particulate emission."

Regarding Applicant's arguments on the Jahnke reference (at page 13, last paragraph, to page 14, first paragraph), the Jahnke reference (at column 2, lines 6-19) was merely relied upon for its teaching that the precise leg length, between the leg junction and the distal end, would have been considered a result effective variable by one having ordinary skill in the art. With this teaching, one having ordinary skill in the art would have routinely optimized the length between the leg junction and the distal end to obtain a sufficient accumulation of catalyst in the separator leg for preventing the underflow of vapors from the cyclone separator back into the fluidized

bed, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.

Applicant (at page 17, last paragraph) further argues,

> "The Examiner's further reliance on Danielsen does not overcome the deficiencies of the primary references noted above. In fact, Danielsen also teaches away from the invention by providing a movable sealing part at the distal end of the leg structure."

The Examiner respectfully disagrees. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In the instant case, Danielsen et al. was merely relied upon for its teaching of the claimed ratio of radius/diameter for the radius curve (see column 3, lines 2-10; FIG. 1-2).

Regarding Applicant's arguments on the reference to Luckenbach (see page 18, first to third paragraphs), the Luckenbach et al. reference was merely relied upon to illustrate the conventionality of constructing an angular termination from a succession of straight pipe segment. Luckenbach et al., however, was not relied upon to teach a specific angle for the radius-curved termination.

Applicant's arguments with respect to the secondary reference to Jones (at page 9, second

paragraph, to page 10, second to last paragraph) have been considered, but they are moot in view of the new ground(s) of rejection, as necessitated by the amendments to claim 1, which call for the open termination to be devoid of movable sealing parts "at all times", and which further removes the previously recited limitation of a "radius-curved" single leg termination.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571)272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Primary Examiner, Art Unit 1797